BELL TELEPHONE QUARTERLY

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AMERICAN TELEPHONE & TELEGRAPH CO.
NEW YORK

BELL TELEPHONE QUARTERLY

A Medium of Suggestion and a Record of Progress

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Engineers and Progress

An Address Given at the Annual Dinner of the Society of Automotive Engineers, January 11, 1933

TO the casual observer, the automobile and the telephone do not seem to be at all similar. They do not look much alike, they are not very much alike in their mode of operation. There are, however, certain fundamental similarities between these two devices and the uses that are made of them. Each gives to us an opportunity to make further extension of our personality. By means of the automobile, we may move rapidly from one place to another and bring ourselves into personal contact with others at a distance. By means of the telephone, without moving from one place to another, we may bring ourselves in contact with people at a distance and carry on communication by the spoken word. Both transportation and communication are fundamentals of our modern social structure.

There are other resemblances between the telephone and the automobile. Each is both mechanical and electrical in its nature. In the telephone, perhaps the electrical part predominates; in the automobile, the mechanical part predominates. Electricity and mechanics are, however, essential to both. Each is a product of fundamental ideas developed in the Nineteenth Century. Each was relatively undeveloped at the beginning of the Twentieth Century and attained its growth in this century. There are twenty times as many telephones in use today in the United States and in the world as there were at the beginning of the century and the relative number of automobiles now and then is even greater. Each has shown its greatest development in this country.

Each has been dependent in the past on science and engineer-

ing for its development and likewise will be dependent upon these for its further progress. The development work on each has been largely done within the industry. And, last but not least, each feels the present depression.

After reading some of the history of the social and economic world during the last two or three hundred years, it is curious to note how much surprise there is at the present time in regard to this depression. It is, generally speaking, regarded as something quite novel, quite unprecedented, and it is seriously questioned by many whether we will come out of it. I should like to say something if I can that will remove this idea from your minds. We seem to think of depressions as people in the earlier times thought of a total eclipse of the sun. It was new to them and they were terrified by it, and they did not know whether it would ever end, or how. Today we are not terrified by eclipses.

I should like to read to you a quotation from an article written by Macaulay, the British essayist, and published in 1830, over 100 years ago, in the *Edinburgh Review*.

> The present moment is one of great distress. But how small will that distress appear when we think over the history of the last forty years;—a war, compared with which, all other wars sink into insignificance;—taxation, such as the most heavily taxed people of former times could not have conceived;—a debt larger than all the public debts that ever existed in the world added together. . . .
>
> If we were to prophesy that in the year 1930, a population of fifty millions, better fed, clad, and lodged than the English of our time, will cover these islands . . . —that machines, constructed on principles, yet undiscovered, will be in every house,—that there will be no highways but railroads, no travelling but by steam,—that our debt, vast as it seems to us, will appear to our greatgrandchildren a trifling encumbrance, which might easily be paid off in a year or two,—many people would think us insane. . . .
>
> Hence it is, that though, in every age, every body knows that up to his own time progressive improvement has been taking place, nobody seems to reckon on any improvement during the next generation.
>
> We cannot absolutely prove that those are in error who tell us that so-

ciety has reached the turning point—that we have seen our best days. But so said all who came before us, and with just as much apparent reason. . . .

This article by Macaulay was written in 1830 and not in 1930.

Now let us look at something which was said in our own country in New Haven, Connecticut, in 1837, 95 years ago.

A few months ago, the unparalleled prosperity of our country was the theme of universal gratulation. Such a development of resources, so rapid an augmentation of individual and public wealth, so great a manifestation of the spirit of enterprise, so strong and seemingly rational a confidence in the prospect of unlimited success, were never known before. But how suddenly has all this prosperity been arrested! That confidence, which in modern times, and especially in our own country, is the basis of commercial intercourse, is failing in every quarter; and all the financial interests of the country seem to be convulsed and disorganized. The merchant, whose business is spread out over a wide extent of territory, and who, regarding all his transactions as conducted on safe principles, feared no embarrassment, finds his paper evidences of debt, and acceptances and promises which he has received in exchange for his goods, losing their value; and his ability to meet his engagements is at an end . . . and loss succeeds to loss, till he shuts up his manufactory and dismisses his laborers. The speculator who dreamed himself rich, finds his fancied riches disappearing like an exhalation. . . .

Already, in many a huge fabric that but a few days since resounded with the roar of enginery, all is silent as in a deserted city. . . . Already want, like an armed man, stands at the threshold of many a dwelling, where a few days ago, daily industry brought the supply of daily comforts. . . .

Amid these present calamities, and these portentous omens of the future, it is not strange that many minds are seeking, and all voices are debating, the cause and the remedy.

Note the reference nearly 100 years ago to the speculator who dreamed himself rich and finds his fancied riches have disappeared.

Let us now step ahead a little in time and consider an extract from an editorial which was published in *Harpers' Weekly* in 1857, about 75 years ago.

It is a gloomy moment in history. Not for many years—not in the lifetime of most men who read this paper—has there been so much grave and deep apprehension; never the future has seemed so incalculable as at this time. In our country there is universal commercial prostration and panic, and thousands of our poorest fellow-citizens are turned out against the approaching Winter without employment, and without the prospect of it.

In France the political cauldron seethes and bubbles with uncertainty; Russia hangs as usual, like a cloud, dark and silent upon the horizon of Europe; while all the energies and influences of the British Empire are sorely tried, and are yet to be tried more sorely.

It is a solemn moment, and no man can feel an indifference in the issue of events.

Of our own troubles no man can see the end. . . .

Note the gloom and note the reference to the European situation.

Now moving forward to 1886, let us consider a brief abstract from the First Annual Report of the U. S. Commissioner of Labor, Carroll D. Wright, written and published 47 years ago.

The rapid development and adaptation of machinery in all the activities belonging to production and transportation have brought what is commonly called over-production, so that machinery and over-production are two causes so closely allied that it is quite difficult to discuss the one without taking the other into consideration. . . . On all sides one sees the accomplished results of the labor of half a century. From a financial point of view, these accomplished results should always be good, but in many cases it is apparent that undertakings have proved deceptive and Governments become needy and some . . . insolvent. Whatever may have been the financial results, industry has been enormously developed, cities have been transformed, distances covered, and a new set of economic tools has been given in profusion to rich countries, and in a more reasonable amount to poorer ones. What is strictly necessary has been done oftentimes to superfluity. This full supply of economic tools to meet the wants of nearly all branches of commerce and industry is the most important factor in the present industrial depression. It is true that the discovery of new processes of manufacture will undoubtedly continue, and this will act as an ameliorating influence, but it will not leave room for a marked extension, such as has been witnessed during the last fifty years, or afford a remunerative employment of the vast amount of capital which has been created during that period. The market price of products will continue low,

no matter what the cost of production may be. The day of large profits is probably past. There may be room for further intensive, but not extensive, development of industry in the present area of civilization.

Note the suggestion of technological unemployment and note that the day of large profits is probably past, or so he says.

Any one of these quotations could be read almost without the change of a word to describe the present situation, and these are only a few of the quotations that are available. Any number can be gotten together of the same general type.

It is particularly interesting, I think, to engineers, in connection with this depression, that, while Wright in his report of 1886 hints more or less at the responsibility of the scientist, the engineer, the chemist and others for the depression, that is, for the creating of technological unemployment, the current depression is really the first for which scientists and engineers have been generally blamed. Not only have we had to stand our share of the grief of the depression, but, adding insult to injury, we and those who are applying science to the uses of mankind are blamed for the depression.

Let me state very briefly what in my judgment it is clear that the scientist, the engineer and the others applying science to the uses of mankind have done for the world. We have freed the world from the physical menace of famine. We have raised the general standards of living. We have supplied mankind with increased leisure. We have provided new means and opportunities for education, entertainment and amusement. We have relieved man of much of the drudgery of labor. These have been great achievements, and I do not have to ask this group whether this is all over. We know as to our own industries that progress has not ended. We know there are going to be new industries, the nature of which we do not conceive of at the present time any more than Wright could see clearly ahead in 1886 when he practically said that about everything that was worth while doing had been done and that there was not much more to do.

At that time the telephone was ten years old and had but little commercial development. He never thought that it would develop to the point where it would furnish employment to about one per cent of the total working population of this country. The automobile, of course, was not in the picture at all. Electric light and power distribution were scientific toys. The moving picture had not started its career. In fact, all of us can think of a hundred and one things which were not available in 1886 and which are important parts of our social and economic life today, and which furnish employment to millions.

I believe that if we were to put ourselves on record as saying that fifty years from now there would not be much of anything of importance except those things which we know of today, you gentlemen can figure as well as I can what such a record would look like then. Somebody might be getting up at a dinner like this fifty years from now and quote such a statement as being an amusing illustration of shortsightedness.

It seems to me that it is clear from reading past economic history that every severe depression is accompanied by certain assumptions by the people of the time. In the judgment of current observers, each depression is regarded as being more severe than those which came before. It is assumed to be of novel character and to have deep-seated causes which either cannot be removed at all or which can only be removed by revolutionary changes. Such a period of depression always gives rise to all kinds of proposals and suggested cures. Some of these, especially those the least fundamental in character, prove to be worthy of serious consideration and trial. Many, subsequent events show, can only be classed as foolish or fantastic. In the past, notwithstanding that the panaceas which were recommended as being the only cure of the then current depression were not adopted, the depression ended just the same and industry went on to higher levels.

From what I am saying, I do not wish you to think that I am belittling the seriousness of the existing situation. It is

serious. It is deplorable. All of the things which are being done to help the situation should be continued and perhaps others will be necessary. History, however, indicates that we do not necessarily need fudamental changes. Certain symptoms need treatment. There are evolutionary changes going on all of the time. These should be continued. If other things are thought of which it is clear will be helpful, they should be done. But the past tells us that there is no use in looking around for a Moses to lead us out of our troubles. We don't get out of depressions by the leadership of Moses. There is no use of looking for a grand and comprehensive plan which will fix everything. We all contributed to getting into our present difficulties and we must all contribute to getting out of them. This process has successfully brought us out of previous depressions.

We engineers may, I believe, congratulate ourselves on the contributions that we have made to civilization. The problems of this era are not the problems of the past. Economic history tells us that up to a period of, say, one hundred years ago, the problems of the world were problems of want as well as the problems of distribution. The methods of production did not permit of creating enough to enable more than a very small number of the inhabitants of the world to live on any basis above a bare level of sustenance. Our problem today is only a part of the former problem and should be a simpler one. It is not the problem that we haven't got and can't get the things necessary to give us a higher economic level. It is the problem of the distribution of plenty. The problem that must be solved now is not the problem of how to create enough to keep the bulk of the people of this country above the level of want. Our problem is, having the ability to produce it, how to distribute it to the population. This change in the social problem is the major contribution to the world of the scientist and those who have worked on the application of science, the engineer and others.

In closing may I again quote from what Macaulay said in 1830:

> We cannot absolutely prove that those are in error who tell us that society has reached the turning point—that we have seen our best days—but so said all who came before us and with just as much apparent reason.

I firmly believe that the future holds in store for us engineers opportunities at least as great as, if not greater than, any that we have had in the past.

BANCROFT GHERARDI

Improvements in Telephone Service

"THE fact that the responsibility for such a large part of the entire telephone service of the country rests solely upon this Company and its Associated Companies . . . imposes on the management an unusual obligation to the public to see to it that the service shall at all times be adequate, dependable and satisfactory to the user." It is the aim "to make it possible for anybody anywhere to pick up a telephone and talk to anyone else, anywhere else, clearly, quickly and at reasonable cost."

With this idea in mind the effort is made to obtain the best possible results in providing, at reasonable cost, a service which is of high technical quality and is satisfactory from the viewpoint of the user. In recent years many important service improvements have been effected. Some of these have been noted in the Annual Reports of the American Company. It should be of interest to take a closer view of these betterments, to consider their significance and some of the processes which have been instrumental in bringing them about. First, however, it should be recognized that public satisfaction is dependent not only on high grade service but also on favorable general attitude toward the company, its personnel, its acts and policies. Two examples may be cited of factors exerting a favorable influence on public opinion. Certainly Mr. Gifford's "Statement of System Policy" made at Dallas in 1927, which is quoted above, has served to increase understanding and favor of System policies and practices. In the day to day operation of the business one of the best opportunities for building favorable impression lies in the many contacts between representatives of the company and the public which it serves. These contacts may involve matters of publicity or public relations; they may have to do with problems of busi-

ness development, right-of-way or construction; they arise in connection with the installation, maintenance and repair service and in connection with the handling of telephone calls; they take place in the business offices regarding such matters as arrangements for service, collections and requests for miscellaneous information. Much has been done and is being done to insure that employees handle these contacts in a manner that the public will consider both pleasing and helpful.

Having made his arrangements for service at the business office or through the employee selling plan, the customer's first impression of the company's performance is usually obtained from the time required to install the necessary apparatus on his premises and to make the service available for use. This interval, which now averages about two and a half days for the System as a whole, has been subject to constant improvement for many years; it was nearly five days on the average in 1925. The so-called "appointment plan" has been a valuable aid in obtaining this result. By this plan an appointment is made with the customer at the time his order is taken as to when the work on his premises will be done. This gives the customer an opportunity to express his preference as to a convenient time and, in the large majority of cases, the work is scheduled in accordance with his suggestion. In the larger cities over 95 per cent of the installation orders are now handled on this basis and the installation forces are meeting the appointment times on about 97 per cent.

The giving of high grade service makes it essential that telephone lines and equipment be kept as free as possible from service failures and interruptions and that such troubles as do occur be cleared promptly. Troubles in telephone plant, which are indicated by the number of subscriber reports per 100 stations, have been nearly halved since 1925. Expressed in terms of frequency, some kind of trouble now occurs on the average subscriber's line or station once in every twenty-four months as compared with once in every thirteen months seven

years ago. Improvement has also been made in the time taken to effect repairs. Ninety-three per cent of all out of service troubles are now cleared on the day on which the trouble is reported—85 per cent being so cleared in 1925. A large majority of these troubles are cleared within a few hours from the time of the report.

Preventive work which aims at locating and correcting line and equipment faults before service impairment occurs has assumed an increasing importance in the maintenance program. Improved methods of recording and classifying troubles have provided those responsible for the maintenance of plant with better information on which to base their operations. Study and analysis of the causes of trouble, particularly those of a recurring nature, have resulted in improved design and in better maintenance practices. More adequate testing and inspection have contributed to the general improvements. Testing is not only more complete than formerly but is now done with improved devices designed to facilitate the finding of faults previously difficult to detect. The volume of inspection has been increased by sampling checks made by supervisors on the work performed by the forces. The checking of the condition of equipment on locations visited by installers, repairmen, cable splicers and linemen on specific jobs has increased the effectiveness of the preventive work.

The local exchange service of the Bell System involves the handling of some 75,000,000 calls a day, of which about 45,000,000 are handled manually and the remainder through dial equipments. In manual service three features stand out as major considerations. The importance of prompt answers to subscribers' signals lies in the indication thus given of the alert availability of telephone communication—the readiness to serve. Service accuracy, which is measured by the degree with which it is found possible to avoid wrong numbers, cutoffs and other interruptions to telephone conversations, carries large weight in the pubic estimate of the service as a whole. The

immediate establishment of a high percentage of connections is, from its very nature, a fundamental requirement under both manual and dial operation. During the last ten years answers to line signals slower than ten seconds have been reduced by 25 per cent, service inaccuracies have been lessened by 50 per cent and calls failing of immediate completion by nearly 20 per cent. If we relate these betterments to the large annual volume of exchange traffic, we find that there are 125,000,000 fewer calls with answers slower than 10 seconds, 125,000,000 fewer calls with service inaccuracies and about 1,000,000,000 more calls with immediate completion. A decrease, in recent years, of more than 50 per cent in subscribers' criticisms regarding these matters indicates a gratifying degree of public appreciation.

There are a few major considerations regarding these features of local service that will indicate the course pursued in their improvement. Ninety-seven per cent of the line signals are now being answered within 10 seconds and the average answer is about 3.5 seconds. This answering service appears to be quite satisfactory to users. The problem is largely one of obtaining as much uniformity as possible from day to day and from hour to hour. Closer adjustment of the forces to varying traffic volumes, with special attention to odd hours when manual switchboards must be operated by reduced forces, better operating performance, particularly as regards expeditious handling and teamwork, and improved equipment arrangements are some of the more important factors in the improved results.

Service accuracy is affected both by telephone company faults and by mistakes made by users; at the present time the inaccuracies resulting from each of these causes are running about 1 per cent. The betterments previously noted relate to those inaccuracies for which the company is wholly or partially responsible. To a large extent, inaccuracies caused by users result from calling a number which is not the number really

desired. The telephone company undertakes to provide every subscriber with an up-to-date directory, and emphasizes the importance of using correct numbers, but the inaccuracies from this source remain fairly constant.

Inaccuracies resulting from company faults occur with different frequency in exchanges of different size, being lower in the smaller places, where the operator receiving the call establishes the connection directly at her own switchboard, and higher in the large cities, where all or nearly all calls require inter-office trunking, a procedure which involves two and in some cases three operators and switchboards. Recent years have seen the development and effective use of new operating practices and supervisory routines aimed at more accurate service. Improved equipment arrangements and better maintenance have contributed to the same end. The attention given to clear enunciation and voice technique, both in the selection of operating employees and in their training, has been an important factor in minimizing uncertainties and misunderstandings between operators. In the large cities, wrong numbers have been reduced radically by the introduction of an improved trunking method, known as straightforward trunking, by which the operator at the calling office selects an idle trunk to the called office over which the call is passed and the connection established. Under the former trunking plan, orders for numbers were passed and trunk assignments obtained over a call wire used in common by many operators.

While the percentage of calls completed immediately is found to be the most practicable measure of the effectiveness of the local service, it should be understood that the majority of calls failing of immediate completion are completed later. During the last ten years there has been an increase in immediate completion from 78 per cent to 82 per cent. Recent improvements in accuracy and in the general quality of the operating work have had a favorable effect on the completion results. However, most calls which fail of immediate completion fail

either because the called line is busy or because no one answers at the called telephone. The busy line situation has been improved by general emphasis on the importance of adequate telephone facilities for subscribers with relatively high usage requirements. The majority of "don't answer" conditions involve cases where there is no one on the subscriber's premises to answer the telephone. But measurable reductions in these occurrences have been effected by bringing to light the need for supplementing or relocating bell equipment so that rings can be heard throughout the premises, for relocating instruments or adding an extension station so that calls can be more quickly and conveniently answered.

In recent years advances of outstanding importance have been made in the handling of toll and long distance service. Better equipment and switching arrangements and improved transmission have removed the previous limitations to good wire communication. The development of radio telephony has resulted in the introduction and extension of intercontinental services and ship-to-shore services; over 90 per cent of the world's telephones can now be reached by Bell System subscribers. Marked improvements have been made in the speed and quality of service.

About 70 per cent of the toll business, including large volumes of short haul traffic around the metropolitan centers, is now handled at local switchboards along with exchange calls and, with the exception of the requirement for ticketing, by the same operating procedures. Over 10 per cent of the total toll business of the System has been given the service advantages of local board operation during the last ten years as a result of the development of new equipment arrangements and methods which have made possible a wider application of this plan.

Service on the longer haul traffic, which is handled at toll boards, has been radically improved both as regards speed and kind by the introduction of a new plan of toll board operation. The speed of service, which is measured by the interval from

the receipt of the signal at the toll board till subscribers start their conversation or are given a definite report of delay in reaching the called party or telephone, now averages about one and one-half minutes as compared with nine minutes ten years ago. The type of service now simulates that on exchange traffic, over 90 per cent of toll board calls being handled immediately they are placed and while the customer remains at the telephone. Under the previous operating plan, calls were recorded by a special group of operators and customers were requested to hang up their receivers as soon as this had been done; calls were handled by another operator group located at switchboards equipped for this operation and customers were recalled when the connection was ready. While improvements were made with this method, there were fundamental limitations as regards speed which do not exist in the new plan which combines the recording and handling functions. The new plan has brought new possibilities for betterments in technical operating, the realization of which has allowed of continued service refinement.

Unsatisfactory transmission, cut-offs and other interruptions to subscribers' conversations have been reduced by two-thirds since 1925; over 98 per cent of the toll board calls are now free from these faults. This result is the more significant for the reason that the expansion of the system and, more particularly, the increase in usage involving longer distances and localities off the main traffic routes, have added to the difficulties. Several factors have contributed to the improved results: better records of unsatisfactory occurrences and effective action based on careful analysis of these records; improved design and better maintenance; special treatment of routes shown to experience an unusual amount of trouble; better route selection for traffic requiring switching, with special operating practices on the more difficult business; adoption of a system-wide toll switching plan which minimizes the amount of switching and provides high grade facilities between key points.

Over 91 per cent of toll board calls are now being completed. In the last ten years the percentage of uncompleted calls has been reduced by nearly one-third, even though during this period large volumes of business with high completion possibilities have been transferred to local board operation. These completion figures relate to the final disposition of calls. Toll board traffic includes not only calls for numbers, which is the characteristic of local service, but also calls for particular persons. The requirement for reaching a particular person increases the chance for completion failure, as in many cases persons are reached only after several efforts on the part of the operator and in some cases they cannot be reached at all. Completion improvement has been brought about largely by the development of improved practices and more thorough treatment of calls encountering delay. In the latter work it is necessary to maintain a satisfactory balance between increased completion and unfavorable public reaction to over-attention or over-persistence on individual calls.

Dial operation has become a major factor in service progress; approximately 5,500,000 telephones are now being operated on this basis. The introduction of the dial system, which has been going on since 1921, is a part of the general plan to keep the design and improvement of switching systems in line with service requirements as indicated by long range estimates. Experience through periods of rapid growth has shown clearly that, in the long run, it would be difficult and expensive to meet future demands for telephone communication and to continue to improve service relying entirely on manual operation. Dial service and manual service are different in detail but, in both, speed and accuracy are considerations of first importance. Dial service is faster and more accurate than manual. Furthermore, with the dial there is less variation in the speed of connection, and, due to the fact that full operating facilities are available at all times, the dial service has a distinct advantage at night, on Sundays and at other times when manual switch-

boards must be operated with largely reduced forces. The handling through the machine of large volumes of traffic susceptible to this treatment allows a concentration of the manual effort on that part of the service which offers the greatest opportunity for improvement through personalized attention to individual calls. For the toll service, for special services and for other manual operations supplementing the dial, there are requirements for large numbers of operating employees.

Private branch exchange operation has a large bearing on service results and on the problem of effecting improvements. Approximately one-fifth of the telephones connected to the Bell System receive service through these private boards, in the operation of which subscribers employ nearly 100,000 operators. In many of the large cities 50 per cent of the traffic goes through at least one private branch board. A local call between telephones connected to different private boards involves twice as many operators and twice as many connecting points as a call between two telephones connected directly to the central office. The telephone companies carry on a number of activities which are designed to assist subscribers with private branch boards in obtaining a satisfactory grade of service and these activities have been instrumental in effecting improvements. The companies maintain specially trained groups for rendering this assistance. They hold themselves in readiness to supply competent operators either for permanent or temporary employment. They provide school facilities for the initial training or retraining of subscribers' employees.

Service betterments of the kind that have been referred to provide concrete expressions of the effectiveness of the work of many groups in the Bell System organization—research experts charged with developing improved equipment arrangements for central offices, outside plant and subscribers' stations —engineers responsible for plans that assure the proper amounts of the right type of equipment being in the right place at the right time—factory, construction and installation forces

who carry out these plans for additions and betterments in the physical plant—staff groups both in the Associated Companies and at 195 Broadway working on improved service arrangements, operating and engineering practices and supervisory processes—maintenance men who keep the apparatus in condition for service—and the operators at telephone switchboards.

M. B. FRENCH

We Fight a Sleet Storm

TWO hundred communities in North Dakota found themselves back in comparatively primitive modes of living for a few days in October. Kerosene lamps were dug out of attics and strove vainly to take the place of electric lights; radios stood silent; electric refrigerators "defrosted" and stood warm and useless, horse rigs supplanted automobiles—and the telephone in many cases was voiceless.

A sleet and snow storm had paralyzed transportation, electric power transmission and communication. About 50,000 of the 70,000 square miles in North Dakota were affected by the storm, the communities in the sleet area suffering damage in varying degrees.

A drizzling rain which began to fall on October 18 turned into ice and snow as the day became colder. Throughout the following night the icy drizzle continued until precipitation aggregated more than an inch. The temperature dropped slightly below the freezing point turning the rain into ice wherever it fell. This icy coating is sleet, also called "glaze." A northwest wind reaching velocities of 24 to 31 miles an hour completed the triangle of forces—rain, freezing temperature and wind—which wrought havoc. Wires, poles, trees, signs and other things which might have withstood the burden of ice were unable to withstand the combination of ice and wind.

The sleet area extended from Colorado in the United States to Manitoba in Canada but the damage was slight except in North Dakota.

Snow followed the sleet, particularly in the Black Hills of South Dakota and in North Dakota, and the heavy wind whipped up snow banks which stopped or seriously handicapped highway and even railroad travel. A train was stuck in a snow-filled cut near Max, North Dakota. The train crew,

helped by willing passengers, dug a path through the snow but it filled up again in an hour. A railroad snow plow was sent to the rescue but failed to reach the marooned train in its first attempt.

Telephone, telegraph and power lines suffered most severely. The ice on wires was from one inch to an inch and a half in diameter. At the peak of the trouble a total of 199 communities were isolated so far as long distance communication with the outside world was concerned. Of these, 58 were exchanges of the Northwestern Bell Telephone Company and 141 were toll points and connecting company exchanges. A total of 12,858 telephone poles were down, of which 11,000 were long distance poles of the Northwestern Company. A total of 2,275 miles of the Associated Company's long distance wires were damaged. Telephone lines running parallel with the direction of the storm generally remained intact, while the lines which were struck broadside were unable to withstand the terrific strain of the wind against the load of ice.

Among businesses which were handicapped both by the lack of power service and communication service were newspapers. Long distance lines and special circuits which carry news from neighboring communities and from faraway parts of the world were crippled. Even if the news could have been obtained there was no electric power to run their linotype machines or their presses. Some newspapers came out several days late on presses run by improvised gasoline engines and in type set partly by hand.

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Sleet is the greatest physical hazard with which the telephone industry in this country has had to contend. Hurricanes may visit portions of the country, cyclones may rip across prairies, and fires and floods may inflict damage but all of these hazards are secondary compared with the vast damage which sleet accompanied by wind may inflict on telephone wires within a few hours. The weight of sleet clinging to wires at a temperature

hovering around the freezing point, and with a wind blowing, will tear down telephone lines which raging snowstorms and sub-zero weather may not harm at all.

When a sleet storm appears, the first step in restoring telephone service is to get reports to plant headquarters of the extent of damage so that the head of that department can mobilize men and materials. Just as soon as the sleet started to cling to wires plant men in the area affected went out to patrol the lines and to estimate the damage.

Since practically all means of communication and transportation were down, the job of getting estimates of the damage into district headquarters and into Fargo, headquarters for the North Dakota area of the Northwestern Bell Telephone Company, was extremely difficult. The use of airplanes was considered but the storm continued so long and visibility was so poor that it was impossible to use this modern method of quick inspection.

In spite of obstacles, reports were gotten into Fargo by various means. The traffic department helped to "build up" circuit in roundabout ways, going hundreds and even thousands of miles to get around a gap in toll lines. Reports were also brought to strategic points in person and by mail.

Local radio stations co-operated whole-heartedly in the efforts of the telephone company to restore service. Among these was station KFYR at Bismarck, capital of the State, which was directly in the path of the worst sleet. In the emergency, radio was used both to make reports from the stricken area to Fargo and from Fargo to the crews at work in the field. Messages were broadcast asking individuals who might hear them to take them to certain offices or certain foremen. Scores of people heard the messages and transmitted them to their destination.

At Fargo, area headquarters, maps were placed on the walls of the offices of the plant manager and the construction superintendent. These maps showed the extent of damage and later the rate of restoration. The reports covered the number of toll

poles down, the amount of toll wire down, the damage to exchange plant, the number of exchanges isolated, the number of stations out of service, the damage to connecting companies, and conditions in general.

* * * * *

With estimates of the damage pouring in, the plant manager was able to organize his forces to combat the sleet. Just as soon as the plant men in the various communities had reported the extent of the damage they went to work making repairs. These first repairs were principally efforts to restore service within towns.

Reports quickly indicated that the comparatively small construction forces of the North Dakota area would be unable to cope with the situation. Calls for help were sent immediately to the Minnesota and the Iowa areas of the Northwestern Bell company. Within a short time it became apparent that still more assistance would be required and calls for more crews were sent to the Nebraska–South Dakota area of the company and to the Long Lines department of the American Telephone and Telegraph Company. Crews which were on routine work in the other areas dropped the jobs before them and soon their trucks were rumbling over the highways toward the scene of the disaster in the north. Within a few hours after getting the calls, 12 crews were on their way from Iowa, 10 from Minnesota and 4 from Nebraska–South Dakota. Three Long Lines crews also headed for North Dakota.

All incoming crews were asked to bring their own telephone trucks instead of coming by train and taking a chance on renting commercial trucks in the territory where they were to work. It is not always possible to rent trucks in small communities, and even when it is possible, the ordinary trucks are good only for transportation and hauling purposes, while telephone company trucks are equipped with pole setters, winches and other equipment which expedite construction work. By using their

own trucks, crews from other states arrived on the scene quickly, were protected against the elements by the tarpaulin coverings, were able to bring tools and equipment, and could restore service faster. The plan of having borrowed crews bring their own trucks worked out very satisfactorily.

Probably the longest trip was that of a foreman who was working at Oxford, Nebraska, near the Kansas line. The call from Fargo came at 9 o'clock at night and by 11 o'clock the foreman and two men were started on the 250-mile drive from Oxford to Omaha. They drove all night and arrived shortly after noon, picked up four more men who were waiting in Omaha, laid in a stock of tools and equipment and started for Grand Forks, North Dakota, at 3 o'clock. The drive from Omaha to Grand Forks was nearly 600 miles and from Grand Forks they still had about 100 miles to go, making a total of about 1,000 miles from their starting point.

While crews were coming in, the construction superintendent planned his attack on the enemy. Seven supervisory foremen were assigned to strategic points in the sleet area. These were the tireless field generals who directed the work of a total of 40 foremen and their crews.

In restoration work in North Dakota local men were hired for the work of groundmen and tasks which did not require technical telephone knowledge or experience. This plan saved the transporting of such men hundreds of miles. It also meant the hiring of residents in small communities and on farms in a period of unemployment when local residents were glad to find work. When a crew moved from one town to the next new men were hired at the community at which it arrived thereby spreading employment over the entire sleet area.

While plant forces naturally bore the brunt of work in the sleet emergency, employees of all other departments also took part.

Mobilization of men is only one part of an offensive against sleet. Just as soldiers in war need ammunition so storm re-

pairmen need materials. Poles, crossarms, wires and other material in local supply yards were quickly exhausted but thanks to the co-operation of the Western Electric Company and modern methods of transportation a steady stream of supplies kept coming in to the crews. This problem of materials is no small part of the generalship of combating a storm. Sometimes the problem of materials is the biggest one.

In the North Dakota case the Western Electric Company shipped supplies from its warehouse in Minneapolis and in turn replenished its stock from the warehouses at Omaha and Des Moines and from its plant at Hawthorne near Chicago. Economy of transportation of poles was effected by shipping them directly from the pole yards of suppliers in Spokane and other points in the northwest. A total of 4,374 poles, 8,000 insulators, 1,500 crossarms and a large number of miscellaneous supplies were shipped in.

The advantage of standardization of equipment, training and methods in the Bell System was strikingly demonstrated in the mobilization of men and material to fight the sleet storm. Men who were rushed from surrounding states found equipment and tools like those to which they were accustomed at home; they worked effectively with plant men whom they had never seen before as their training methods had been about the same.

The value of the services of the Western Electric Company to the Bell System likewise was shown. Instead of there being a wild scurry to get poles, wire and other supplies, a steady stream of materials was set in motion with a minimum of effort, and the construction men who valiantly were working to restore service felt assured that from the reserves of the Western Electric they would have materials with which to work.

* * * * *

Restoration work was divided into three phases. First efforts were to get up important lines just as quickly as possible to restore inter-city communication to all towns in the shortest

possible time. In some cases one line was put through and all towns hooked up to that one long distance line just as farmers get service over one pair of wires. The term plant men use for this first restoration is "to jury up" a line.

The problem in this first restoration or "jurying up" is to restore the pole line to carry circuits temporarily, without the delay required to set new poles, replace damaged crossarms and do other work. In order to do this, crossarms are bolted to stumps of poles, top sections of poles are set into the ground, poles broken at the ground line are reset—anything to get service re-established. Customary clearances of wires above ground are disregarded except over highways, railroads or wherever injury might result.

Following the "jurying up" of shattered lines, the second step in restoration was made. The second phase consisted of restoring practically all service. Where damage to poles and wires was small, complete repairs were made, but where the damage was severe only temporary repairs were made. A second sleet storm four days after the first storm tore down again some of the repaired lines in the vicinity of Minot.

The third step is the final restoration of all telephone plant which fell before the attack of the sleet. Some of this work was halted when frost prevented working in the ground and will not be completed until the spring of 1933.

All wires of the fourteen circuits of the transcontinental line into Bismarck from the East were broken, but service into Bismarck, including a radio program supply circuit, was restored the day after the storm. The ten circuits of the transcontinental line west of Bismarck to Dickinson likewise were severed by the sleet. Although the wire was badly damaged, service was restored in five days.

Handicaps which confronted construction crews included snowdrifts, which sometimes prevented the use of trucks and necessitated the substitution of horses and wagons; bad side roads where there was no pavement or gravel; inclement

weather; and limited housing and feeding accommodations because towns were so small. Another handicap was the fact that of the lines which were down, 1,500 miles were along railroad right-of-way and were not easily accessible with trucks.

Crews worked from daylight to darkness, driving in from the job after darkness had settled down. One crew got stuck in the snow on the way home and worked until midnight extricating itself. Even after they arrived at their rooms after 12 hours or more in the field, the day was not over for foremen and other supervisors, for they had reports to file of the day's work and plans to make for the day to come.

* * * * *

The restoration of lines was not done in a haphazard manner. While construction men were in the field laboring with poles and wires, engineers pored over blue prints and were out on trips of inspection determining what facilities should be restored first and making plans for permanent restoration. Often telephone plant is rebuilt on a different basis than the original. Growth or other conditions may have made changes advisable. For instance, in the town of Edmore the telephone plant was badly damaged. Instead of restringing wire on poles, engineers decided that it would be better to install an entire new system of cable. The proper sizes of cable were rushed to the scene by the Western Electric Company and installed at once to serve the town.

Traffic engineers also had engineering work to do in determining what circuits were most essential in preliminary restoration work and also what circuits will be required for future use in accordance with their studies of telephone traffic in the territory.

* * * * *

Why this quick mobilizing of men and material, why working hours from daybreak to dark, why the working in spite of obstacles and hardships?

It is because of the recognition by everyone in the telephone business that telephone service is vital to communities and to individuals. Every telephone worker did everything possible to meet the needs of customers.

Long distance calls of an urgent nature were handled by circuitous routes. For instance, Minot was not isolated from the North and West and calls which ordinarily would cross the state from Minot to Fargo, a distance of a little over 200 miles, were handled in some cases by way of Fargo, Winnipeg, Calgary, back to Regina and down to Minot, a distance of 1,750 miles. Likewise, calls from Fargo to Williston and Dickinson went all the way around by Minneapolis, Chicago, Denver, to Billings, Montana, and into North Dakota from the West. This roundabout way was a thousand miles longer than the route through Canada. One urgent call from Winner to Rapid City, South Dakota, less than 100 miles away, was switched around by way of Norfolk, Nebraska, Omaha, Denver, Casper, Wyoming, and then into the Black Hills from the West, a distance of 1,700 miles.

The long distance service of the Bell System is affected when a sleet storm cuts all lines in any locality and leaves a blank spot in the network of the System. But the Long Lines department of the System is ready to meet such emergencies by means of "traffic control bureaus," organized for just that purpose.

When reports of the failure of lines in North Dakota began to come in, the Long Lines control bureau in Chicago immediately began to rearrange circuits, pooling the facilities of the American Telephone and Telegraph Company with those of Associated Companies of the Bell System. The control bureau established "patches" around the break section.

The circuit between Chicago and Helena, Montana, which normally would go over the northern transcontinental route, was established via Salt Lake City, using lines of the Mountain States Telephone and Telegraph Company north to Butte, Montana. The Chicago-Seattle circuit used the same route.

Minneapolis-Helena circuits were routed to Chicago and then by the Salt Lake way. Circuits from Chicago to Portland, Oregon, went around by way of San Francisco, using facilities of the Pacific Telephone and Telegraph Company.

Believing that telephone customers should know what was being done to restore service to them, advertisements were used in newspapers telling of the extent of the damage and the progress of the work of reopening communication. Similar information was contained in an insert sent with telephone bills to customers. Newspapers were kept informed and given all facts about the damage and reconstruction work. That the public appreciated the difficulties which faced the telephone company in restoring service and the heroic efforts of telephone employees was evident from numerous word-of-mouth commendations, letters and newspaper comments.

The following is an editorial which appeared in the Fargo Forum:

Just a pleasant jangling of nickels in coin receivers, a slitting of envelopes containing fat checks—that's the version many have of the telephone business.

But consider the Northwestern Bell Telephone Company and the recent series of sleet and snowstorms in North Dakota. It must expend more than $250,000 to repair damage caused by the dislodging of thousands of poles, the snapping and snarling of many miles of wires. While heroic deeds are being performed in biting cold by hundreds of linemen, its office personnel must answer pacifically an irate public which cannot understand why a long distance call cannot be completed through an area where poles are down and lines are broken.

Add to this the heavy loss in revenue through curtailment of long distance facilities plus the practice of rebating for any period of lack of service for 24 hours or more.

The following story in the Daily News of Minot is an example of the perseverance of telephone men in their efforts to restore service:

Because a Minot man, nearly tired out, plowed through snowbanks and groped in the darkness last night, subscribers of The News today are

enabled to read State and world news from the Associated Press in this issue.

Somewhere west of Minot, the wire over which the Associated Press dispatches are sent to The News from the St. Paul offices, went " open " yesterday. This has been a temporary and roundabout circuit from St. Paul to Chicago, Salt Lake City, Helena, Glendive, Williston and thence to Minot, instead of the usual direct line from St. Paul to Minot, which has been out of order for several days, due to storms.

Kenneth Rauk, Minot, lineman for the Northwestern Bell Telephone Company, came from Granville to Minot yesterday forenoon, nearly six hours being required for the 24-mile journey. Instruments in the Minot offices indicated the wire break was somewhere near Manitou, in western Mountrail county, and Rauk and helpers were sent out to find it.

Late last evening Rauk called from Stanley; he and his helpers, Maynard Peterson and Harry Manternach, were very tired. Did the line have to be fixed last night?

" It means no Associated Press news for Daily News readers unless it is," Charles Keith, wire chief in Minot, told him.

" All right, we'll find it and fix it," replied Rauk.

Near Manitou, about midnight, the workmen discovered the break. Other telephone poles and wires had fallen over the line and broken it. The electric lantern carried by the men went out, but they worked on with a flashlight, and the line was repaired.

And so today, over several thousand miles of wires, Associated Press dispatches clicked into The News office through the automatic telegraph printers, thanks to Lineman Rauk who didn't have to find the " break " last night but did.

SIGURD U. BERGH

EDITOR'S NOTE: Mr. Bergh's contribution is based on personal information which he gathered as editor of *The Northwestern Bell*, the employee's magazine of the Northwestern Bell Telephone Company.

The Service of Classified Telephone Directories

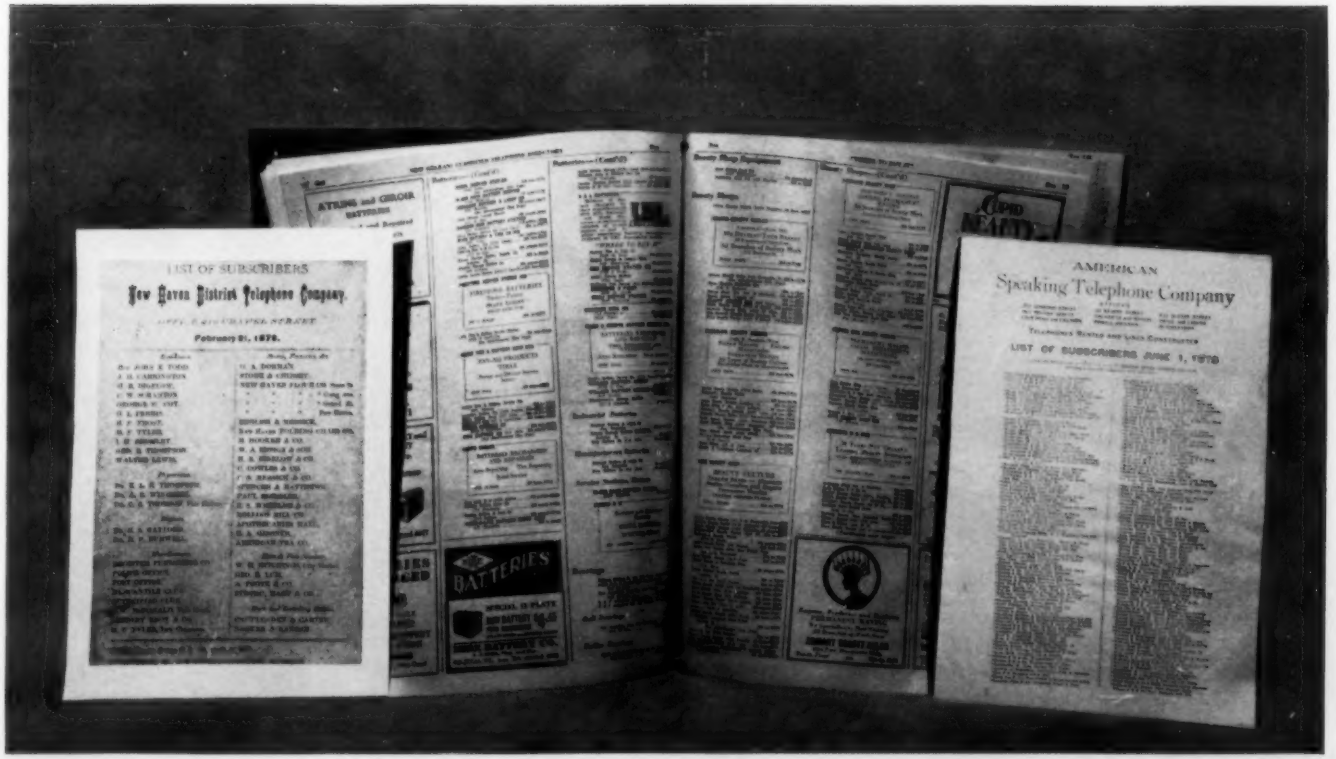
THE world's first commercial telephone exchange was opened for service in New Haven, Conn., on January 28, 1878, and on February 21 of the same year was issued the first telephone directory: "List of Subscribers, New Haven District Telephone Company." In less than a month it had become apparent that a directory of subscribers was a necessary adjunct to the rendering of telephone service.

This first directory was a small card containing fifty listings, and since subscribers were not listed in any alphabetical order but were grouped under headings such as "Residences," "Physicians," "Meat & Fish Markets," "Hack and Boarding Stables," etc., it may properly be called also the first classified telephone directory.

It was soon evident that, with a larger list, the arrangement of subscribers alphabetically was needed, and the second directory, issued in San Francisco on June 1 of 1878 with 178 listings, was the first to record its subscribers in that orderly fashion.

As the telephone grew in popularity throughout the country and the number of subscribers increased, with consequent increase in the number of listings in each directory, the opportunity was recognized to increase the usefulness of the directory service to subscribers by issuing, in addition to the alphabetical directories, lists of business subscribers grouped according to the businesses they were engaged in. The user of the telephone directory would find this supplementary list an additional convenience, and the value of telephone service to business concerns would be enhanced.

Beginning with a page or two, these classified lists of business subscribers have grown, along with the telephone business, to



TWO PAGES OF A CURRENT CLASSIFIED TELEPHONE DIRECTORY, FLANKED BY THE NEW HAVEN AND SAN FRANCISCO LISTS OF 1878—THE FIRST AND SECOND TELEPHONE DIRECTORIES IN THE WORLD.

the highly developed and useful classified telephone directories of the present day. The cities of the United States have classified directories to the number of about 1,000, all of the large and medium-sized cities being represented and many of the smaller ones. The classified directory is bound under the same cover with the alphabetical directory, except in a few of the larger cities where they are published as separate volumes because of their bulk.

To make the classified directories of maximum use to business men and subscribers, improvements have been made from time to time, and beginning in 1926 a rather complete change was brought about. This included a new and better standard of typography, a better arrangement of the display advertising, and a revision of the classifications which made for greater ease of reference and completeness of the buying service. At the same time a new feature, known as Trade Mark Service, was introduced. This service is simple in form, in method of purchase, and in operation. As purchased by a manufacturer or other user, Trade Mark Service comprises the inclusion of the name of his product or service in the appropriate position in the columns of directories in the towns where he has dealers or representatives, followed by the name, address, and telephone number of each authorized dealer or representative. This makes it possible for a manufacturer or other purchaser of Trade Mark Service to direct readers of his national advertising to the local representative by a simple reference in each advertisement to the listing of his product or service in the classified directory. It also makes it possible for a prospective purchaser to locate readily the authorized local source of supply, instead of having to "shop around" to find who handles the desired product or service.

These improvements in the typographical appearance and arrangement of the classified directories, together with the introduction of Trade Mark Service, have made the directories of even greater convenience to the telephone user, and more

productive to the business man who uses its columns to promote his business.

The usefulness of the classified directory has been advertised in national publications by the American Telephone and Telegraph Company, and locally by the Associated Bell Companies through newspaper space, direct mail, posters, and billboards. This publicity has pointed out the convenience of using the classified: its accessibility, completeness—all business telephone subscribers are classified—and the new feature of Trade Mark Service. As a result of this advertising, telephone users have been frequently reminded that each subscriber is provided with a complete catalog of the businesses of the community for his use and convenience.

The usefulness of the classified directory as a Buyers' Guide and a telephone service convenience, together with the publicity to familiarize the public with it, have resulted in the classified directory becoming one of the most used and most useful books in the community. The many unsolicited comments from business concerns who received orders and inquiries for their products and services as a result of their listings and advertising in the classified directories give an indication of the place these catalogs of business information hold in the communities they serve. Studies undertaken in a number of cities throughout the country also indicate that classified directories are used by large numbers of subscribers.

With this knowledge as a background, a survey of a typical medium-sized city was undertaken last year, to develop facts about the use of the classified directory and also a procedure which would facilitate surveys under similar conditions at other points.

Columbus, Ohio, with a population of about 300,000 and approximately 50,000 telephone subscribers, was selected for the test. Based on existing knowledge of the extent of classified directory use, it was determined that a sample of 700

residence subscribers and 250 business subscribers, selected at random, would give an accurate picture.

Consideration was next given to the method of interviewing subscribers. The three usual methods of canvassing—mail, telephone, and personal visit—were studied in the light of time and expense involved and expected accuracy of results. A telephone canvass was decided upon, since it permitted the most rapid and economical coverage and, for the type of information desired, included practically all of the advantages of the personal interview while not involving the time and expense.

Attention was then given to the type of questions to be asked. The survey was intended to indicate in general: (1) volume of use, (2) scope of use, (3) type of use. A questionnaire was developed which contained questions designed to secure such information.

The employees selected to canvass the subscribers were the directory advertising sales representatives. These men were, of course, familiar with all phases of the classified directories and in a good position to discuss intelligently any points raised by subscribers as a result of the questions asked. The experience was also expected to be valuable to them in their later sales contacts with business subscribers.

The days of the week and the hours of the day assigned for canvassing were also given consideration. In calling residences, it was expected that week-days from 9 to 11:30 and from 1 to 4:30 would offer the least inconvenience to housewives and necessitate fewer recalls to those not at home or engaged in household duties. In the case of business concerns, no calls were planned for the noon hour. No calls were planned for either business houses or residences on Saturday afternoons.

The results of the survey indicated that 90 per cent of the subscribers interviewed used the classified directory: 68 per cent occasionally, and 22 per cent frequently. While these figures are impressive, and indicate that the classified directory

fills a real need in the community, probably the most striking fact brought out by the survey was that 60 per cent of the users gave specific instances of use, naming the classified headings to which they had referred. A total of 931 instances were cited, covering a range of 159 different classified headings.

A compilation of the classified headings most frequently referred to disclosed some interesting facts. Heading the list were *Plumbers,* with 89 references, followed by *Cleaners and Dyers,* with 72. There were 42 references to *Taxicabs,* while *Coal* was in demand with 39, in spite of the fact that the survey was made in September. Other classifications frequently mentioned were *Physicians, Laundries, Rug Cleaners, Beauty Parlors, Radio Service,* and *Electric Service,* in the order named. Seasonal influences undoubtedly were a factor in the classifications mentioned, *Awnings* and *Screens,* for example, being two which would probably be uppermost in the minds of subscribers during the early summer months, and *Furnaces* and *Weatherstripping* in the winter.

In answer to one of the questions asked in the survey, 72 per cent stated that they used the classified directory in preference to the alphabetical when seeking the telephone numbers of business subscribers. While it was known that the classified directory is consulted for the purpose of finding the telephone numbers of known business subscribers about whose initials or address there is some doubt, the frequency of such use as disclosed in the survey was greater than had been anticipated.

One of the questions asked was designed to determine the reason for the selection of a certain business concern when consulting the classified directory. An analysis of the answers to this question disclosed that 52 per cent were influenced to call businesses whose names were recognized when seen in the classified directory, 23 per cent made their selections on the basis of location, and 22 per cent were influenced in their selections by the wording of the advertisements in the classified directory.

The survey also disclosed a number of instances where subscribers referred to directory classifications in words different from that of the classified heading plan. This information is valuable because it indicates the wording which naturally occurs to subscribers and gives an opportunity for further study of the classifications in the directory, with the possibility of adding cross-reference headings or revising some of the present headings to conform more nearly with the habits of the telephone users.

One of the interesting features of the survey was the almost negligible number of subscribers who indicated any annoyance at being called to answer questions concerning the telephone directory. On the other hand, there were a number of instances of subscribers who seemed rather pleased that they had been selected. All business subscribers who were questioned were told that when the directory sales representative called, before the close of the next directory, he would be glad to show the results of the study, and a number expressed considerable interest in seeing the results.

Careful analysis of the results of the Columbus survey indicate (1) that the classified directory as at present constituted is meeting the needs of a large majority of subscribers, (2) that the telephone questionnaire plan of canvassing used was satisfactory, although the experiment pointed out the need for slight revisions in the questionnaire to insure greater accuracy, (3) that the "sample" of 950 subscribers was adequate to give an accurate picture of the usage habits of Columbus subscribers, (4) that studies now under way to revise and improve the classifications used in the directories should be continued as a means of increasing the value of the directory to both users and advertisers.

The continued development of the classified directory through surveys such as that conducted in Columbus is but one phase of the Bell System's constant endeavor to increase the usefulness of telephone service to the public.

J. F. ALLEN

Elections and Communications

DURING the recent national political campaign and election, Bell System facilities were again extensively called upon to deliver the messages of the nominees for office, as well as the election results, to both the listening and the reading public. The program transmission systems of the broadcasting companies were busy almost nightly carrying the voices of speakers extolling their party platforms, and the leased wire systems of the press were equally busy reporting the text of the speeches, the public reaction and other interesting phases of the campaign.

The listening public has been given countless opportunities to marvel at the wonders of telephony, and a broader conception of the part it plays in radio is being gained as time goes on. However, little thought has been given to the part that Bell System service plays in making the news of the day available to us in the daily press.

Our major press associations, The Associated Press, United Press Associations, International News Service and Universal Service, use all of our many forms of communication in the collection and dissemination of the news. Their wire systems consist of:

Teletypewriter service, which forms the basis of their nation-wide trunk wire and state news distributing systems.

Telegraph service, formerly the most extensively used class of service, which is now employed for the most part to supplement the teletypewriter service on trunk routes and for handling sporting results, such as baseball and racing.

Public News Telephone service, furnished for fixed daily periods on a contract basis, which is used to deliver a limited report to the smallest newspapers.

NEWS ROOM IN THE NEW YORK OFFICE OF THE UNITED PRESS, SHOWING THE ELABORATE COMMUNICATION EQUIPMENT WHICH PERMITS THE RAPID COLLECTION AND DISSEMINATION OF NEWS TO AND FROM ALL PARTS OF THE WORLD.

In the News Room of the New York Office of the Associated Press, Teletypewriter Operators are Sending Out Stories which are Being Received on Similar Machines by Member Newspapers as Fast as they are Typed in New York.

Teletypewriter Exchange service, our newest form of service, which is being used for administrative purposes and has superseded public news telephone service in some few cases.

Telephotograph service, which furnishes a rapid means of transmitting pictures associated with important news events in those instances where they are desired.

Toll service, principally used for collecting news at its source. Its scope extends to our transoceanic service for obtaining foreign news of major interest.

All of these services are utilized to cover spot news of the day, political developments during the sessions of Congress and the many State Legislatures, economic developments, sporting results and other types of news in which there is a wide public interest. The large newspapers require in addition to a news report, a complete tabulation of the daily fluctuations in stocks, bonds, cotton, grain and other basic commodities traded on the important exchanges of the country.

The general news report is transmitted to approximately 1300 cities and towns which have their own daily journals, and service networks extending from coast to coast and from our Northern boundary to the Southern are involved in its transmission. These networks also extend to the principal cities of Canada, to Havana, and to Mexico City, and require the use of approximately 400,000 miles of wire, 3600 teletypewriter machines and thousands of telephones.

As evidenced by the number of newspapers served and the different types of service used, the press associations have a varied news requirement to meet. To handle this with speed and accuracy, a well balanced division of circuit groups, both from the standpoint of traffic load and area, is a necessity. The trunk circuits, of which there are 150, and which operate on a double or triple wire basis, provide a medium through which the news is exchanged and at the same time serve the larger newspapers and news distributing centers of the press

associations. They average from five to twelve points per circuit and are arranged so as to involve the least number of manual or mechanical relays for distributing the report.

News is exchanged between New York and San Francisco with but one repetition, and any important news happening reaches even the most remote point with not more than four relays. The distributing centers or Bureau Offices, as they are commonly referred to, are set up to edit the copy received to fit the needs of the medium sized newspapers which are served on a single wire basis. These single wire circuits, which usually operate within the bounds of one state, total 140 in number and range from ten to twenty points per circuit. Bureau Offices are also charged with the responsibility of transmitting to the smaller newspapers a suitable news report of from 700 to 1500 words per day by public news telephone service. These services require 190 circuits with an average of two receiving points per circuit.

With the trunk systems carrying more than 100,000 words per day and the single state circuits carrying approximately 25,000 words, the leased wire systems of the press are taxed at all times, but particularly so every four years when they are called upon to handle, in addition to the ordinary run of news, the collection and dissemination of the results of national elections. The total operating layouts on the night of November 8, 1932, were about three times greater than the normal nightly layouts, because of the need for additional facilities for exchanging the results throughout the country. Spare teletypewriter machines normally relied upon for protective purposes had to be utilized by the press associations to transmit or receive the facts and figures. However, the extra wire layouts in operation on election night were only what might be called the facilities required for putting the finishing touches to the job.

A means for gathering the election results from the various election precincts was needed during the day and well into the

night. For this purpose toll service was as extensively used as any other form of communication, if not more so.

With this system set up and functioning, information as to the voting on presidential, gubernatorial and congressional candidates was relayed to the distributing centers, from which it was relayed into offices of hundreds of newspapers.

An undertaking of this magnitude required close co-operation between the operating forces of the press associations and the various branches of the Bell System personnel. The telephone operators were putting forth every effort to complete the toll calls as quickly as possible, the test rooms were monitoring teletypewriter and telegraph services, always alert to make any quick change in layout that wire conditions might warrant, and the maintenance forces were ready to respond to any emergency that might have arisen from the extended use of the teletypewriter equipment.

The service result and the manner in which it was received can best be explained by quoting the written and oral comments of the press associations. One said, "Our A. T. & T. circuits on election night worked so well and we received such excellent supervision over those wires that I can not help but write to you in commendation of the men in your organization responsible for the work." Another reported, "Our service on election night was fine. It was another case of where the A. T. & T. did its job without muffing the ball." From a third this was the comment: "Service furnished us on election night was without parallel."

HARRY JEAVONS

The Bell System Exhibit at the "Century of Progress" Exposition

THAT 1933 is the centennial of Chicago is the occasion for an international exposition—a "World's Fair"—which opens in that city on June 1. The past century, however, has a wider significance, and this the promoters symbolized in their choice of a name—*A Century of Progress* International Exposition. As they express it:

> In the hundred years of Chicago's existence, science has entered world industry and wrought amazing changes in everyday life. At the beginning of this era, man groped blindly for those laws which would enable him to mould the forces of Nature to his use and comfort. Today the results of that mastery of man over Nature are evident in new means of transportation, in new methods of communication, new processes of manufacturing, new weapons for fighting disease and new products that make our lives more comfortable, healthful and safe.
>
> A Century of Progress International Exposition will tell by easy stages and in simple form the story of scientific discoveries and inventions based on those discoveries, their application to industry and the resultant transformation that has made the world of today so different from the world of a century ago.

When the trustees of the Exposition, of which Rufus C. Dawes is president, decided that the Century of Progress should depict "the contributions of pure and applied science to industrial development during the last hundred years" as its main theme, they turned to the National Research Council for advice and assistance in formulating and developing that theme. The National Research Council, which is a coöperative organization of eighty national societies in the fields of science, engineering, and industrial technology, accepted the invitation and formed for that purpose a Science Advisory Committee with Dr. F. B. Jewett, Vice-President of the American Telephone and Telegraph Company, as its chairman. The

presidents of a number of national societies were invited to appoint eminent men from their memberships to serve as individuals on that committee. Men were selected with a breadth of understanding sufficient to visualize a great national exposition along the line contemplated and of a standing which guaranteed the acceptance of their findings. To this group of professional members there was added a number of men, of wide interest in public affairs and in the broad application of science to national life, to serve on the committee as members-at-large.

This advisory committee, which through subcommittees expanded ultimately to include over four hundred members, represented the specific fields of science, engineering, and technology. Its studies, which were both extensive and detailed, resulted, after several months, in thirty-four complete reports covering the broader fields. These reports furnished the material for the basic plan and philosophy which the Science Advisory Committee submitted to the Exposition authorities. With the acceptance of its report, early in 1930, by the Exposition Trustees, the basic plan and philosophy of the Exposition became fully indicated. There remained for the Exposition itself the practical and financial problems (which were, of course, enhanced by the increasing economic depression) of the embodiment of this philosophy in buildings and exhibits.

This exposition, incidentally, differs from its predecessors in being privately financed, not supported by subsidy from national, state, or city government, and not dependent upon government financial help. Its initial funds were raised by bond issues which were subscribed to by private individuals and local business enterprises. Those funds represent the confidence and community spirit of Chicago citizens. By that means were assured the construction of certain general buildings and exhibits and the operation of the Exposition. For the balance it was set up on a pay-as-you-enter basis where buildings were planned to meet the needs of various groups

of exhibitors and were constructed as the leases were signed for the rental of their exhibit areas.

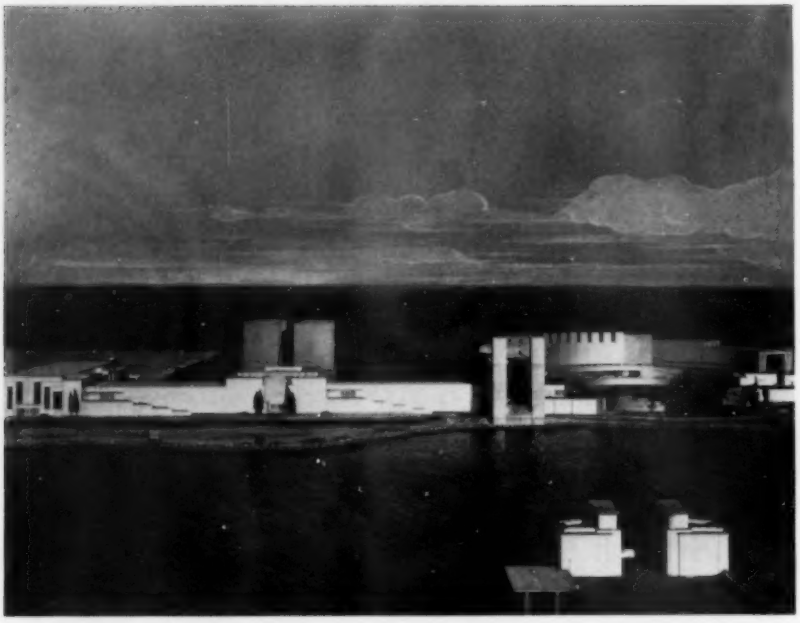
Foremost in the program of the Exposition, and of its advisors, was the construction of a vast Hall of Science which should house exhibits depicting the fundamental laws and phenomena of the various basic sciences. This building was one of the first erected and its scientific exhibits are, in general, to be arranged and paid for by the Exposition.

Starting from such a "temple of science" it was proposed that there should be grouped about it other buildings, representing industrial applications of the various sciences, with space leased to corresponding industries which would install appropriate exhibits. The first to be erected of these buildings representing applied science is an enormous framework, with a roof suspended on a catenary construction of cables, which is known as the Travel and Transport Building. The next to be erected was the electrical group. This was made possible by assurances of the major executives in that field that their organizations would take space and operate exhibits.

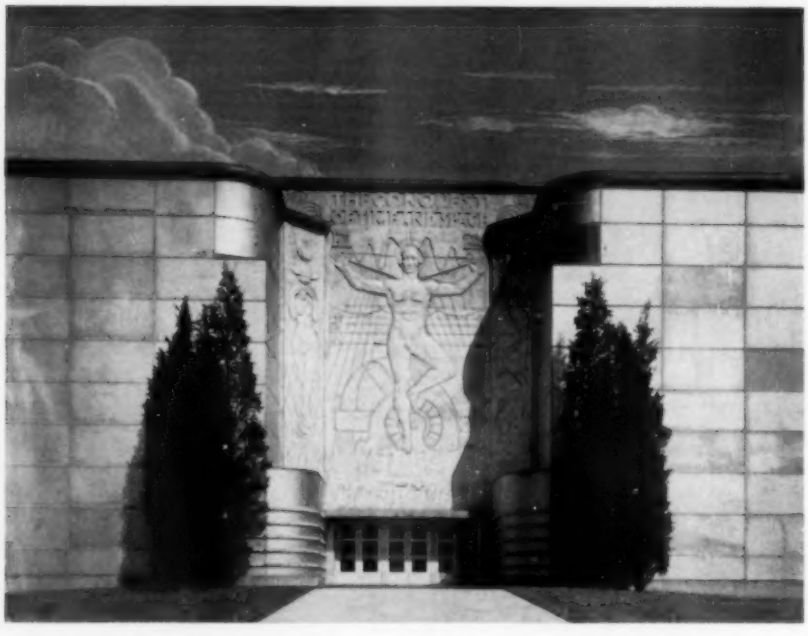
The central portion of this electrical group, which forms a long building of three interconnected sections, is the Communication Building. In this the Bell System, the Western Union Telegraph Company, and the International Telephone and Telegraph Company agreed to coöperate in maintaining an exhibit of the art of electrical communication in keeping with the philosophy of the exposition.

The Communication Building will house exhibits of *two-way* communication. The amusement applications of communication techniques, whether of radio broadcasting or of sound pictures, are to be located elsewhere. The technical unity of the communication arts, which arose from the inventions of Morse and Bell, their worldwide importance and service, the essential coöperation which communication implies and communication companies practice—all this, it is hoped, will be felt by the visitor to the Communication Building. Although there

CENTURY OF PROGRESS EXPOSITION. A COMBINATION OF AIRPLANE VIEW AND ARCHITECT'S RENDERING. THE ELECTRICAL GROUP IS PARTIALLY HIDDEN BY THE STEEL TOWER ON THE LEFT. THE BRIDGE CONNECTS THE NORTHERN END OF THE ELECTRICAL GROUP WITH THE HALL OF SCIENCE.



THE ELECTRICAL GROUP AS VIEWED ACROSS THE LAGOON FROM THE HALL OF SCIENCE. THE TOWERS WHICH APPEAR IN THE CENTRAL BACKGROUND ENCLOSE THE COMMUNICATION COURT.



THE WESTERN ENTRANCE TO THE COMMUNICATION BUILDING.

will be no exhibits in common and each of the three companies will occupy its own assigned space, there will be evident in the choice and arrangement of exhibits and the architecture of the building—particularly in its centrally located communication court—something of this underlying spirit of communication. In fact, the plans originally drawn for the electrical group were altered by its architect, Raymond Hood, with the approval of the Exposition authorities, and the exhibit areas proposed for communication industries regrouped to emphasize these ideas.

The Exposition, which is located on the lake front of Chicago, extends from about Twelfth to Thirty-first Streets. It occupies several hundred acres, reclaimed from Lake Michigan. It lies to the east of the Field Museum and Soldiers' Field, and extends south of that stadium on the east side of the Lief Ericsson Drive. A large part of the ground is essentially an island which extends south from the Adler Planetarium, enclosing with the mainland an attractive lagoon. The general location is shown by the accompanying picture, where the Soldiers' Field stadium, and the Adler Planetarium on the extreme left, are easily recognized points.

The Hall of Science is located on the mainland, and on the island directly across the lagoon from it is the electrical group. A bridge connects the two buildings, starting from the second floor of one and ending on the second floor of the other, but with ramps at either end to the ground level. One of the accompanying pictures shows the electrical group as viewed from the Hall of Science. In this picture the bridge, which is to the left, does not appear, for the view is taken from the portion of the Hall of Science which is directly opposite the Communication Building of the electrical group.

In the general picture of the Fair grounds the electrical group can be located by the connecting bridge, although in the picture it is partially hidden by a huge tower. These towers were not included in the original artistic visualization of the

Exposition grounds, and there is some divergence of opinion as to whether they add or detract from the general appearance. The towers, which are now in the course of erection, are the terminals for a ride across the lagoon at a level of 200 feet. They will be about 600 feet high and at their tops have observation platforms and restaurant facilities.

The Communication Building has eight different entrances, and only a good guess can be made at present as to which will prove the most popular. The building, plans of which are shown in an accompanying diagram, consists really of two parts: one portion forms a continuous part of the electrical group, and the other, consisting of four separate high towers, forms a court or formal garden on the lake side of the main portion of the building.

These four towers, of rough concrete, run up about 110 feet. They will probably be colored in green and in effect form huge "trees" enclosing a quiet space which will be the "Communication Court." The towers are about twenty feet apart and the court may be entered from the north, east, or south. In the center of the court is a shallow pool for which a tile bottom is being constructed bearing a design symbolic of the speed and world-wide range of electrical communication, and on the border the names of the three industries. The towers will be colored and specially illuminated at night, and the quiet center which they form on the lake front should prove very attractive. In the base of each tower is a pavilion of about 700 square feet area.

The northwest and southwest pavilions connect directly with the adjacent exhibit areas in the main building. Between these two pavilions, as shown in the accompanying floor plans, there is a wide entrance on the first floor of the Communication Building. Broad winding stairs also lead around the outside of the two western towers to the second floor of the main building from which there is another entrance to the building.

In the division of space between the American Telephone

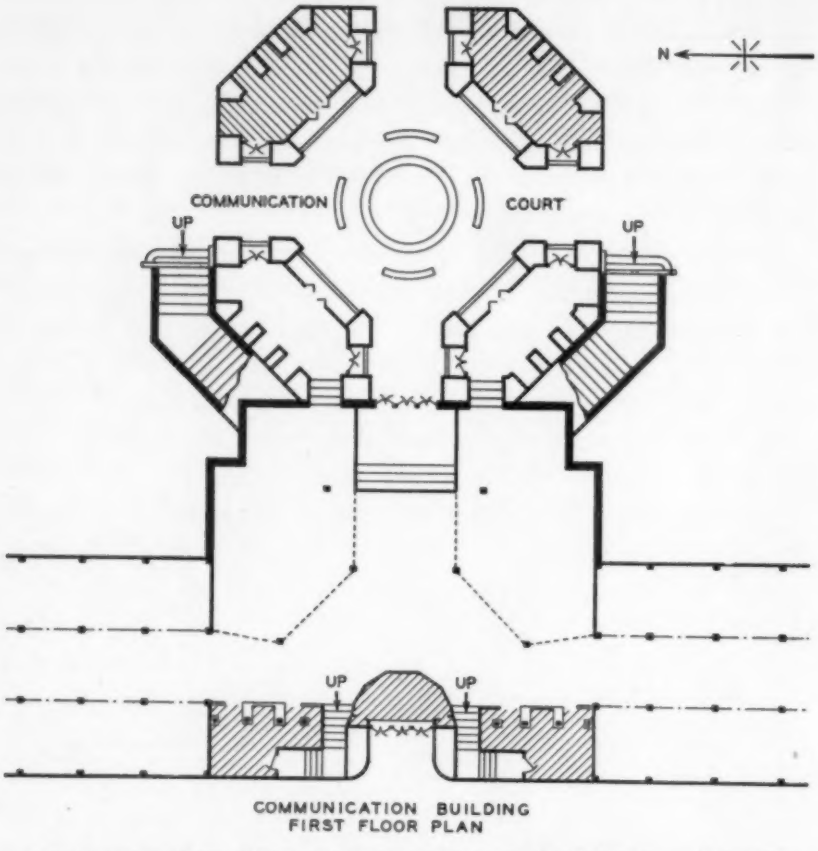
and Telegraph Company, the Western Union Telegraph Company, and the International Telephone and Telegraph Company, the two eastern pavilions were taken by the Bell System, the northwest by the Western Union and the southwest by the International. The spaces on the first floor of the main building immediately adjoining the western pavilions are occupied by the last named companies. Across the hall on the west side of the building and on either side of the doorway are spaces assigned to the Bell System. An aisle with exhibit booths on each side connects the Communication Building to the other sections of the electrical group.

On the second floor, the aisle from the other sections swings around a balcony rail, leaving a well or large open space from the ground floor to the roof. In addition to the entrance reached by stairways around the pavilions, there is another second floor entrance. This is provided by an exterior flight of stairs which ends in a wide doorway into the corridor at a point just south of the Communication Building.

The two large triangular areas and the two smaller rectangular ones on the second floor are Bell System spaces. In addition, a semicircular mezzanine balcony is being erected over the west doorway and projecting into the well. The demonstration which will take place in this area, which is also a Bell System area, will be observed from the edge of the balcony, along which there are being provided a few seats and a protecting rail.

The Bell System exhibit occupies, as is evident from the accompanying sketches, nine separate areas. Although these are apparently widely scattered, it will be recognized that they are also strategically placed so that one or more of them adjoin every entrance to the Communication Building. Furthermore, the entire second floor is devoted solely to Bell System exhibits, and through appropriate decorative treatment and a patterned floor covering it will have a distinct unity of its own.

Plans for the occupancy of the other space in the Electrical Building have undergone alteration since their original projection. The south end of the building—a semicircle around an electrical court—will be occupied, as was originally planned,

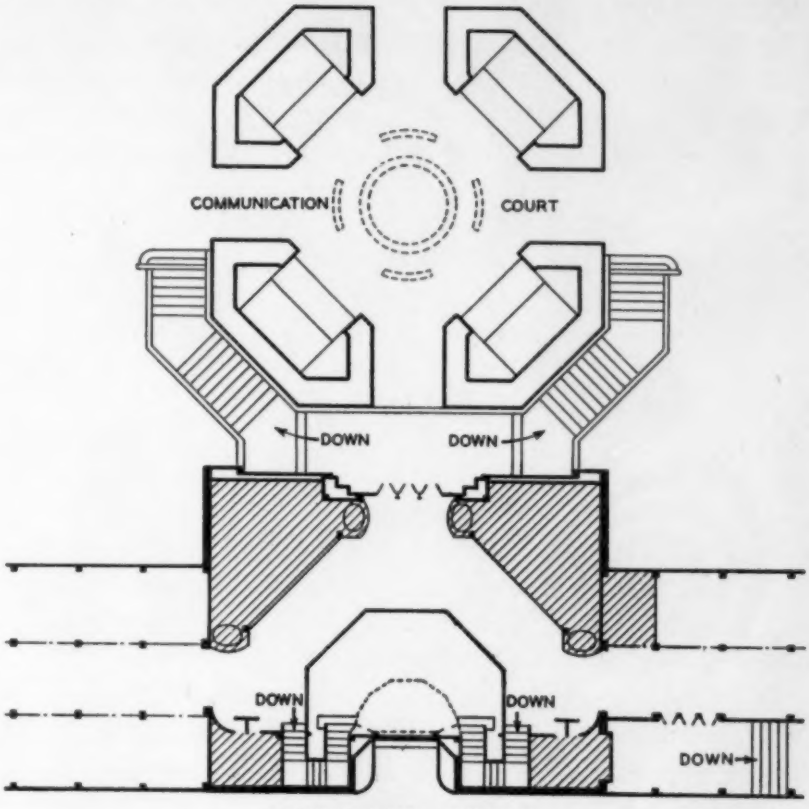


Plan Showing First Floor and Pavilions of the Communication Building. Shaded Areas are Exhibit Areas of the Bell System.

by the light and power industry and its manufacturing companies. Recent alteration of plans has affected, however, the north end of the building which was originally proposed for radio and, it was hoped, for television. For various reasons these plans have been changed and the north end will be

devoted to social science, with the intervening exhibit areas allotted to radio companies.

Arrangements for the Bell System exhibit, which have been carried on under the general direction of Vice-Presidents A. W.



COMMUNICATION BUILDING
SECOND FLOOR PLAN

SECOND FLOOR PLAN, SHOWING OUTLINE OF CONCRETE TOWERS, WHICH RISE A HUNDRED FEET ABOVE THE PAVILIONS, AND STAIRWAYS TO A BALCONY ENTRANCE TO THE COMMUNICATION BUILDING.

Page and F. B. Jewett, of the American Telephone and Telegraph Company, have been rather definitely in consonance with the fundamental plan of the Exposition to show the industrial applications of pure science in two-way communication. In planning the exhibit, a definite philosophy was first

required. Attacking that problem by asking what message the Bell System should convey to the public through its exhibit, it was felt that the exhibit as a whole should emphasize: (*a*) the institutional character and policy of the Bell System; (*b*) the nature and extent of the plant and equipment which lies behind the terminal apparatus with which subscribers are familiar and the operations involved in rendering the services which the System offers; and (*c*) a fuller knowledge of these services and of the convenience and economy accompanying their use.

With this point of view, the two pavilions have been made institutional exhibits and headquarters for the exhibit. Incidentally, to a considerable extent the two other companies in the Communication Building are giving similar treatment to their pavilions so that the "Communication Court" promises a quiet, dignified presentation of the institutional character of the organizations most concerned in two-way communication. The two areas on the first floor are commercial in character and devoted, one to the exemplification of the convenience of the telephone in home and office, and the other to the economies which Bell System services offer to the business man in intercity communication, with particular reference to teletypewriter service, keytown selling, and the like.

In the areas devoted to the convenience and economy of Bell System services there will be representatives who can discuss with interested visitors any of these services. There will also be exhibits of substation equipment and of teletypewriters and some related demonstrations of a scientific character. For example, there will be provided in one exhibit area an oscillograph and associated with it a loud speaker. This oscillograph will show the wave form of words which come from the loud speaker. The apparatus will give an idea of the complexity and range of sounds which must be accurately transmitted and reproduced in order to give high quality telephone service. In the other exhibit area there is

proposed a small demonstration equipment to show the operation of a step-by-step system of switching. This demonstration will operate in response to dialing by a visitor.

The second floor areas are devoted to illustrating the equipment and methods of operation which lie behind the scenes in Bell System services. One large triangular space will contain an exhibit of panel switching in which there will appear the various types of frames necessary in central offices. Demonstration calls can be made through this equipment. One demonstration call will be set up and carried out automatically once every minute with attention directed to the operations involved by flashing signs and by lights on the moving parts of the mechanism. Other parts of the mechanism will be in operation as if transmitting calls, so as to give some idea of the type, although not of the extent, of equipment and operations involved in dial central offices. Three dial telephones will also be provided nearby at the desk of an attendant from which any visitor may dial any one of three other telephones on the opposite side of the desk and while doing so trace through appropriately colored lights the operations of the mechanism and the progress of his particular call through the panel frames.

This dial telephone exhibit illustrates one of the principles adopted in planning all the other exhibits. First, for the visitor who would hurry by, it provides some impression of the magnitude and complexity of the operations involved in interconnecting telephone subscribers. For the man who is attracted and willing to spend a little more time it provides an opportunity to take part himself in the demonstration by dialing a call of his own selection and observing its progress. And third, it provides for those with further interest a chance to examine the equipment in detail and on a reading desk extending beneath the equipment to find sufficiently complete and technical explanations. In general an attempt has been made to provide in each instance an exhibit and material suited

to all degrees of comprehension and interest from the casual to the expert.

The other triangular area will be devoted to a demonstration of the speed and quality of intercity telephone service, with demonstrations of telephone calls from Chicago to one or two important cities in each state of the Union.

The two rectangular areas on the same floor will be devoted to engineering demonstrations of proven and popular interest. One consists of inverted speech and privacy of radio telephone conversations, and the other of carrier-current communication and the multiple channel use of lines. The mezzanine balcony will contain demonstrations of scientific character the details of which are now being worked out.

In addition to the exhibit areas just described, four small elliptical areas are obtained by partitioning off the exterior corners of the two triangular areas, as may be seen from the second floor plan. In each of these there will be demonstrated some typical operation which is involved in rendering communication service. To visualize one of these demonstrations one imagines a central office where a black cloth is spread so as to hide all the switchboard and all its operators, except just one position and the operator in front of it. That is what the visitor to the Exposition will see in each of these four niches. A mild spotlight concealed above will illuminate the position and its operator, and the back and sides of the niche will be finished in dull black. Through an arrangement of cams and relays a dummy or fictitious load will be produced so that the operator will carry on the usual type of operations. The load, although characteristic in types of operation, will be lighter than usual and she will be expected to answer questions on the part of visitors. So that she may pause to answer, a switch will be provided by which she can momentarily interrupt the signals of the dummy load. It is planned also that her voice shall be assisted by a lapel microphone and a small concealed loud speaker.

The four positions to be thus demonstrated are those of a manual operator in the central office of a small city; a dial service operator who, in a large dial exchange, performs various services for subscribers; a call announcer operator of a metropolitan area; and a teletypewriter exchange operator. In the case of the call announcer position it will be possible for the visitor himself to dial any four digit number which he desires and hear the words as does an operator at such a position. Incidentally, adjoining this operator's position in this case there will also be call indicator equipment which will be available for the visitor to demonstrate for himself by dialing.

The teletypewriter exchange operator, in addition to carrying a fictitious load, will actually perform upon signal the switching operations required by either of two teletypewriters which are exhibited in the commercial space on the floor below. There will thus be possible a complete demonstration of both terminals of a teletypewriter system and of the "T.W.X. position."

In a similar way the operator at the manual position will give service to a number of telephones located for demonstration purposes in the first floor area which is devoted to the convenience of telephones in home and office.

Such in general is the character of the Bell System exhibit which the American Telephone and Telegraph Company is planning at the Century of Progress on behalf of its associated companies.

The erection of the building was completed some time ago and the installation of switchboard equipment is now being carried out by the Western Electric Company.

Such a wide variety of services, of equipment, of engineering techniques and operating practices is involved in the work of the Bell System that no limited exhibit can adequately portray its work. Selection, therefore, was necessary and only a small number of typical operations was possible. Those chosen, in general, are those which have proven to be of greatest interest

to visitors to the telephone plant and to the Laboratories. It is probable, therefore, that they will attract favorable attention and will interest the large section of the public which has been unable to visit central offices.

A general question, however, arises in the minds of many people as to the probable extent of attendance at this exposition. To some it appears at first glance that world's fairs are out of date; that magazines and Sunday supplements and newsreels and the mobility which the public has acquired through the automobile and other improved transportation services make such expositions unnecessary as a means for the dissemination of information and education. On the other hand, this very mobility which the automobile has made possible means a greater ease in taking advantage of the exposition and it is confidently expected by the Exposition authorities that, whatever may be the attendance from great distances, there will be an enormous attendance from within one day's drive of Chicago. The authorities, in coöperation with other city agencies, are planning highway routing schemes, information centers, authorized tourist camps, and a number of other means for facilitating visits by automobile. The confidence which they have appears to be shared by others; and there seems to be considerable ground for belief that the exposition, which will undoubtedly open on time, will prove a success.

JOHN MILLS

EDITOR'S NOTE: Mr. Mills is of the staff of the Bell Telephone Laboratories and from the inception of the general idea of Bell System participation in the Chicago Exposition has been in charge of all arrangements involved in executing the architectural and technical plans.

The International Telegraph and Radio Conferences of Madrid

BEGINNING on September 3 and continuing until December 10, 1932, there occurred at Madrid, Spain, an important world conference on international electrical communications. It was unique in being the first general international conference to review in its entirety the whole field of international electric communications, including telegraph, telephone and radio. It was, in reality, a dual conference representing two meetings held simultaneously, and in some respects jointly, under each of the two existing treaties, one the International Telegraph Convention of St. Petersburg of 1875, with its more recently revised Regulations, and the other, the International Radiotelegraph Convention of Washington, 1927.

There had grown up a desire on the part of many nations of the world to combine these existing conventions and their associated regulations into a co-ordinated whole, and the object of holding the two Madrid meetings simultaneously was to undertake the working out of a combined convention. But principally there was the task of bringing these older conventions with their regulations up to date and, in so doing, settling several questions which had become of rather pressing importance in recent years. Outstanding among these problems in the field of telegraphy was the question of the length of the code word to be used in code language telegrams, and in the field of radio, the question of satisying the demands of the various countries of Europe for additional waves for broadcasting.

The conferences met under the chairmanship of the Spanish Government and consisted of delegates from about 75 countries, together with representatives from about 50 communication companies and from nearly 30 other invited organizations

having some interest in the questions under consideration. In all, about 600 persons were in attendance. The secretarial work was carried on by the International Bureau of the Telegraph Union, assisted by the Spanish Government. The discussions were carried on in both French and English, interpreters having been furnished by the United States Government, although hereafter they are to be furnished by the International Bureau. The documents of the conference were issued in French, the translations into English by the American delegation were made available to the delegates of other countries who wished to have them. The magnitude of the task of the conference may be appreciated from its scope and the fact that it had for its consideration approximately three thousand proposals.

Convention

The Convention, as adopted, combines the principal provisions of both of the previously existing Conventions. It is applicable to telegraph and telephone services whether conducted by wire or radio, and also to broadcasting and other special forms of radio communication. Its first article provides that the countries which are parties to the Convention form the "International Telecommunication Union." Succeeding articles provide for the organization of the Union and the conduct of conferences for the revision of the Convention and Regulations. Another group of articles contains general provisions applicable to telegraph and telephone services, such as those relating to secrecy, non-discrimination, suspension of service, etc. A third group of articles relates entirely to radio communication and is taken substantially from the Washington Convention. The Convention is to go into effect on January 1, 1934.

One of the important provisions of the Convention makes the Convention binding on a given government only as regards those services which are covered by the Regulations

which have been adopted by that government. There are three separate sets of Regulations supplementing the Convention, those relating to telegraph, telephone and radio communication. The Convention makes obligatory the signing of only one of these sets of Regulations. The Radio Regulations are divided into "General" and "Supplementary Regulations," the signing of the latter not being obligatory on parties to the former. The delegates of the United States of America signed only the Convention and the General Radio Communication Regulations. The effect of these provisions, therefore, is that while the Convention is a combined telegraph, telephone and radio convention as to form, it is applicable to a given service only to the extent that each government undertakes to be bound by the regulations governing that service. In the case of the United States, therefore, the practical result is to make substantially no change in the situation which existed before the combining of the Conventions. Thus, the action of the conference recognizes the position which the United States has always maintained, namely, that the government undertake obligations only on matters of true governmental concern, and that the procedure for handling international communication service be determined, in accordance with American law and practice, by the operating agencies which furnish the service. The provision of the Convention is such, however, that the participation of the American operating agencies in conferences for the revision of these regulations is only in an advisory status and without vote.

One of the questions which occupied a large amount of time of the conference was the determination of the basis on which the voting would be conducted. It was impossible to reach agreement on a permanent provision for inclusion in the Convention and the United States Government was asked to continue its efforts to secure a solution through diplomatic negotiations. The conference did, however, a few weeks before its close, adopt a temporary rule governing voting at the Madrid

Conference. The difficulties which were met in connection with this question served to emphasize how complex is this problem of representation in a specialized field where technical and economic development, as well as political sovereignty, come into play.

Radio Communication Regulations

The Radio Communication Regulations, annexed to the Convention, consist of a revision of the Regulations adopted at Washington in 1927. No major changes were made in the table giving the allocation of frequencies to the various services. Fuller recognition is given, however, both in the allocation table and in the provisions of the Regulations themselves, to the freedom which each region should have to organize its own radio services, but with the requirement that interference with other regions will not result. To satisfy the pressure which exists in Europe for the expansion of the wave lengths available for broadcasting, the range from 160 to 265 kilocycles was made available for European broadcasting, and an agreement was reached to subdivide this range among the European countries at a regional conference to be held in June, 1933. While the countries of North America reached no agreement at Madrid on any expansion of the broadcasting range, presumably there will be opportunity to consider this problem further at a North American regional radio conference which is to be held at Mexico City in the Spring of 1933.

The Regulations relating to the use of frequencies in the mobile radio service were revised. These rules relate to such matters as the procedure for calling and answering, the handling of distress and emergency messages in the aviation and marine services, certain provisions relating to ship-to-shore telephony, etc.

As at the Washington Conference, the radio regulations which relate primarily to the handling of radiotelegraph message traffic in the marine service were grouped in a supple-

mentary section, subject to separate signature, in order that they might not become obligatory on countries like the United States and Canada in which the government does not operate the public international communication services.

Telegraph Regulations

The Telegraph Regulations, as distinguished from the Convention to which they are annexed, have been revised from time to time and were last revised at Brussels in 1928. While many points of detail were modified at the Madrid Conference, the most significant change is that relating to the handling of telegrams in code language. Hereafter such telegrams are to be charged for as consisting of words or groups of five characters each (formerly ten-letter groups were permitted as well). The charge for the transmission of a five-letter group is to be 60 per cent of that for a plain-language word in the extra-European service and 70 per cent in the European service. Formerly these factors were 66 2/3 per cent and 75 per cent, respectively.

The chapter of the Telegraph Regulations relating to the transmission of radiotelegrams in the marine service has been omitted, this subject being left entirely to the Radio Communication Regulations (principally the Supplementary Regulations).

Telephone Regulations

The Telephone Regulations, annexed to the Convention, consist of a revision of the Regulations which formerly comprised a telephone chapter of the Telegraph Regulations. The first article of the Telephone Regulations provides that they are applicable only to international telephone service over circuits which are entirely within the European regime, the conditions and practices in Europe differing materially from those obtaining in America. The practices to be followed on intercontinental services and generally in regions outside of the

European regime are left to determination directly by the operating agencies concerned.

International Consulting Committees

The three International Consulting Committees, on telephony, telegraphy and radio, are continued in substantially their previous status. The provisions relating to their constitution and functions are contained in the respective Regulations, the Convention article merely providing that such committees may be formed. The provisions relating to the three committees have been made slightly more uniform than previously; membership in all may be had both by governments and by private operating agencies; voting takes place in accordance with the rules applied to the conduct of the preceding administrative conference, except that where a country is not represented by a government telegraph, telephone or radio administration, as the case may be, the vote for that country may be cast by the corresponding member companies as a whole. In general, the Telephone Committee, which will hereafter be designated as C. C. I. F., and the Telegraph Committee (C. C. I. T.) are to meet every two years, while the Radio Committee (C. C. I. R.) is to meet once every five years, i.e., once between each two radio administrative conferences. As a consequence of the rapid development of the radio art, however, it is possible that an additional meeting of the C. C. I. R. will be held in connection with the next administrative radio conference. Provision is made for the holding of special meetings on the request of a sufficient number of countries.

Reservations—European Protocol

A number of reservations were appended to the Telegraph and Radio Regulations. In view of the present instability of the currencies of various countries, with respect to gold, about 30 countries reserved their right not to apply the provisions of the Telegraph Regulations whereby rates equivalent to those

originally quoted in gold francs would have to be collected from the users of the international telegraph service.

Several countries took exception to certain detailed provisions of the Radio Regulations, the most notable being the reservations which a number of countries made with regard to the frequency bands allocated to broadcasting. The delegation of the Union of Soviet Socialist Republics declared that it intended to continue to use for broadcasting, aviation and direction finding, certain of the long wave bands between 150 and 550 kilocycles, which it had been able to use for those purposes in view of its not being a party to the Washington Convention, and which bands are allocated, so far as the rest of the world is concerned, largely to maritime mobile service. Several countries gave notice of their readiness to protect their services against interference from any broadcasting stations of the Soviet Republics which might operate outside of the generally accepted bands.

A group of about ten European countries which are primarily interested in improving the wave length status of their broadcasting stations gave notice that unless the forthcoming European radio conference makes adequate provision for their broadcasting stations, these countries will not ratify the Radio Communication Regulations signed at Madrid. After the conference had spent several weeks in an attempt to reach complete agreement on the allocation of frequency bands to European broadcasting, aviation and marine services in the long wave range, it was finally agreed to make few changes in the present allocation but to rely upon a solution of this problem by the European Conference.

The detailed basis of action of the European Conference and authority to depart, in certain respects, from the Madrid allocation, was formulated in a European protocol signed by the European delegates at the same time as the Convention. The protocol places a tentative limitation of 150 kilowatts on the power of European broadcasting stations and proposes certain

limitations on the strength of signals to be produced in order to minimize interference in adjacent countries. This protocol also provides that a tentative allocation of specific frequencies to broadcasting stations in Europe shall be formulated by the International Broadcasting Union (of Europe) and that this allocation shall serve as the basis for discussion at the European Conference to be held in Switzerland in June, 1933.

Subsequent Conferences

The Madrid Conference accepted the invitation of the Government of Egypt to hold the next general conference at Cairo in 1937. That conference will, in reality, consist of three separate "administrative" conferences, meeting simultaneously, to revise the Telegraph, Telephone and Radio Communication Regulations, respectively.

Representation

The United States Government was represented at this conference by the following official delegates: Judge Eugene O. Sykes, Dr. C. B. Jolliffe, Dr. Irvin Stewart and Dr. Walter Lichtenstein. In addition, technical advisers were present from the Departments of Navy, War, Commerce and Treasury and the Federal Radio Commission. The American Telephone and Telegraph Company was represented during all or part of the conference, by Messrs. E. S. Wilson, H. E. Shreeve, Lloyd Espenschied, J. F. Bratney, L. E. Whittemore and Knud Fick. Representatives were also present from the other principal communication companies of the United States.

L. Espenschied
L. E. Whittemore

Notes on Recent Occurrences

VICE PRESIDENT GHERARDI RECEIVES EDISON MEDAL

THE Edison Medal for 1932 has been awarded by the American Institute of Electrical Engineers to Bancroft Gherardi "for his contributions to the art of telephone engineering and the development of electrical communication."

The Edison Medal was founded by associates and friends of Thomas A. Edison, and is awarded annually for "meritorious achievement in electrical science, electrical engineering, or the electrical arts" by a committee consisting of twenty-four members of the American Institute of Electrical Engineers.

The following eminent engineers and scientists have been recipients of the medal: Elihu Thomson, Frank J. Sprague, George Westinghouse, William Stanley, Charles F. Brush, Alexander Graham Bell, Nikola Tesla, John J. Carty, Benjamin G. Lamme, W. L. R. Emmet, Michael I. Pupin, Cummings C. Chesney, Robert A. Millikan, John W. Lieb, John White Howell, Harris J. Ryan, William D. Coolidge, Frank B. Jewett, Charles F. Scott, Frank Conrad, and Edwin W. Rice, Jr.

The Institute's announcement of the award of the Edison Medal to Mr. Gherardi said in part:

> Mr. Gherardi's entire professional and business career has been devoted to the art of communication. Coming into this field when the telephone art was very young (300,000 telephones in 1895) he has played a most important part in the development and perfection of operating practises and in the development of methods, equipment, and apparatus, which have brought telephone communication to the high state of perfection in which we find it today.
>
> Mr. Gherardi has directed the development and introduction of many new and improved arrangements which are in use today on a large scale, and which have added greatly to the speed and accuracy of local and long distance telephone service.

His broad vision as to the place of communication, not only in the affairs of the people of the United States but also in world affairs, and his initiative and skill in the development of engineering and operating organizations and in the development of the art generally, have contributed enormously to the growth and success of present-day communication.

FLORIDA RADIO STATIONS EXTEND SERVICE SOUTHWARD

OPENING of overseas telephone service through the newly constructed short wave radio telephone transmitting and receiving stations of the American Telephone and Telegraph Company at Miami, Florida, took place during last December with the official inauguration of voice communication between the United States and the Bahama Islands, Colombia, and Venezuela. The transmitting station is at Opa Locka, about ten miles outside of Miami, and the receiving station is at Hialeah, about five miles from that city. The stations are connected with the rest of the Bell System by land lines, and service to the three overseas points is available to all Bell and Bell-connecting telephones in the United States, Canada, Cuba, and Mexico.

Venezuela and Colombia become the sixth and seventh South American republics with which North America now has direct telephonic connection, since service has been in operation to Argentina, Brazil, Chile, Peru, and Uruguay. The Bahamas are the first of the islands of the Caribbean to which radio telephone service is extended, the circuits between this country and Cuba being in deep sea cables.

Service to the Bahamas was opened on December 16, and for the present is limited to Nassau. The charge for a three-minute conversation between New York and the island city is $15.00.

On December 19 service was opened to Venezuela, connecting there with the lines of the Compania Anonima Nacional

Telefonos de Venezuela which cover most of Venezuela's northern seaboard. The cost of a three-minute conversation is $24.00.

Service with Colombia was opened on December 22, the connection at the far end being with Compania Telefonica Central at Bogota. The cost for a three-minute conversation is $24.00.

Service to all three points was inaugurated by an interchange of greetings among government and telephone officials.

SERVICE EXTENDED TO LISBON

ON December 5, overseas telephone service was extended to Lisbon, Portugal, over the regular radio telephone circuits between New York and London and thence by wire via Madrid. Service is available to all Bell and Bell-connecting telephones on this continent and in Cuba, and the charge for a three-minute conversation is $37.50.

CABLE EXTENDED TO DALLAS

WITH the completion of the final links in the line between Kansas City and Dallas, Long Lines toll cable now extends westward to the latter city. The length of the cable between New York and Dallas is about 1950 miles. Service between the two cities over all-cable circuits is scheduled to begin this month.